

**Table 3-6
(Concluded)**

PCDD/PCDF Parameters	CAS#	Detection Limits ¹	
		Water (pg/L)	Soil/Sediment/(pg/g)
OCDF	39001-02-0	100	10
Total TCDD	-	10	1.0
Total PeCDD	-	50	5
Total HxCDD	-	50	5
Total HpCDD	-	50	5
Total TCDF	-	10	1.0
Total PeCDF	-	50	5
Total HxCDF	-	50	5
Total HpCDF	-	50	5

Notes:

TCDD = Tetrachlorodibenzo-p-dioxin
PeCDD = Pentachlorodibenzo-p-dioxin
HxCDD = Hexachlorodibenzo-p-dioxin
HpCDD = Heptachlorodibenzo-p-dioxin

OCDD = Octachlorodibenzo-p-dioxin
TCDF = Tetrachlorodibenzofuran
PeCDF = Pentachlorodibenzofuran

HxCDF = Hexachlorodibenzofuran
HpCDF = Heptachlorodibenzofuran
OCDF = Octachlorodibenzofuran

¹ Detection limits listed are based on the minimum level at which the analytical system will give acceptable selected ion current profiles (SICPs) and calibration as specified in the method. Detection limits are sample and matrix specific and are calculated based on peak height or area of the signal for the internal standard and the noise level associated with the target analyte measurement. Actual detection limits obtained on analysis of field samples may be higher.

This document was developed as part of the conduct of a Remedial Investigation/Feasibility Study in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan to investigate the nature and extent of contamination in sediments in the Six Mile Passaic River Study Area, NJ, including historical and on-going sources. These documents have been developed in cooperation with, and were approved under, CERCLA by U.S. EPA Region 2. The reader is cautioned to carefully consider the specialized goals and objectives of these investigations, and to review all related documents.

QAPP
Revision No. 1.0
January 1995
Section 3 of 14
Page 22 of 24

TABLE 3-7
REQUIRED DETECTION LIMITS FOR METALS^{1,2}

Analyte	ICP ³		CV ⁴		GFAA ⁵	
	Water µg/L	Soil/Sediment mg/kg ⁶	Water µg/L	Soil/Sediment mg/kg ⁶	Water µg/L	Soil/Sediment mg/kg ⁶
Aluminum, Al	200	40	-	-	-	-
Antimony, Sb	60	12	-	-	-	-
Arsenic, As	-	-	-	-	10	2
Barium, Ba	200	40	-	-	-	-
Beryllium, Be	5	1	-	-	-	-
Cadmium, Cd	5	1	-	-	-	-
Calcium, Ca	5000	1000	-	-	-	-
Chromium, Cr	10	2	-	-	-	-
Cobalt, Co	50	10	-	-	-	-
Copper, Cu	25	5	-	-	-	-
Cyanide, CN	20 ⁷	4 ⁷	-	-	-	-
Iron, Fe	100	20	-	-	-	-
Lead, Pb	-	-	-	-	3	0.6
Magnesium, Mg	5,000	1000	-	-	-	-
Manganese, Mn	15	3	-	-	-	-
Mercury	-	-	0.2	0.1	-	-
Nickel, Ni	40	8	-	-	-	-
Potassium, K	5000	1000	-	-	-	-
Selenium, Se	-	-	-	-	5	1
Silver, Ag	10	2	-	-	-	-
Sodium, Na	5000	1000	-	-	-	-
Thallium, Tl	-	-	-	-	10	2
Vanadium, V	50	10	-	-	-	-
Zinc, Zn	20	4	-	-	-	-

This document was developed as part of the conduct of a Remedial Investigation/Feasibility Study in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan to investigate the nature and extent of contamination in sediments in the Six Mile Passaic River Study Area, NJ, including historical and on-going sources. These documents have been developed in cooperation with, and were approved under, CERCLA by U.S. EPA Region 2. The reader is cautioned to carefully consider the specialized goals and objectives of these investigations, and to review all related documents.

QAPP
Revision No. 1.0
January 1995
Section 3 of 14
Page 23 of 24

TABLE 3-7 (Concluded)

- ¹ Specific quantitation limits are highly matrix dependent. The laboratory's IDL on "clean" samples must be less than or equal to the Quantitation Limit. Quantitation limits listed for soil are based on wet weight. Quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, will be higher.
- ² See Table 7-1 for analytical methods.
- ³ ICP = Inductively coupled plasma emission spectrometry.
- ⁴ CV = Cold Vapor Atomic Absorption
- ⁵ GFAA = Graphite Furnace Atomic Absorption
- ⁶ Calculated from the Contract Required Detection Limit (CRDL) for water, USEPA Contract Laboratory Program (CLP) Statement of Work for Inorganics Analysis, ILM 02.0.
- ⁷ Cyanide analysis by titration or Colorimetry.

This document was developed as part of the conduct of a Remedial Investigation/Feasibility Study in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan to investigate the nature and extent of contamination in sediments in the Six Mile Passaic River Study Area, NJ, including historical and on-going sources. These documents have been developed in cooperation with, and were approved under, CERCLA by U.S. EPA Region 2. The reader is cautioned to carefully consider the specialized goals and objectives of these investigations, and to review all related documents.

QAPP
Revision No. 1.0
January 1995
Section 3 of 14
Page 24 of 24

TABLE 3-8
REPORTING LIMITS FOR OTHER ANALYTES^{1,2}

Analyte	Water	Soil/Sediment
Total Organic Carbon (TOC)	1.0 mg/L	100 mg/kg
Total Suspended Solids (TSS)	10 mg/L	N/A
Total Dissolved Solids (TDS)	10 mg/L	N/A

¹ See Table 7-1 for analytical methods.

² N/A = Not Applicable

4.0

SAMPLING PROCEDURES

4.1 SAMPLING PROCEDURES

Sampling protocols, procedures and techniques are described in SOPs in the FSP in order to provide data necessary for the Passaic River study. A summary of the types of samples to be collected, the frequency, and tests that will be performed is specified in the FSP.

4.2 SAMPLE CONTAINERS

In order to assure that appropriate sample quantities are collected in certified, precleaned containers, sample containers for this project will be supplied from commercial suppliers or laboratories. The containers will be cleaned to the quality control standards defined in OSWER Directive #9240.0-05A, Specifications and Guidance for Contaminant-Free Sample Containers, December 1992. Certification of sample container quality per the OSWER Directive will be kept in the project files. Tables 4-1, 4-2A, and 4-2B are summaries of container types which will be provided for sample matrices anticipated to be collected.

4.3 SAMPLE PRESERVATION AND HOLDING TIMES

Procedures for sample preservation are outlined in FSP SOP No. 1. With the exception of aqueous samples to be analyzed for volatile organic compounds or metals, appropriate preservatives will be added to each sample bottle by the contract laboratory prior to shipment to the field. Documentation of the preparation and addition of these reagents will be supplied by the laboratory along with the sample containers. If refrigeration is

necessary, samples will be placed on ice after collection, and shipping containers will be packed with additional ice prior to shipment via overnight carrier.

Aqueous samples for volatile organic compound analysis shall have preservatives added in the field in accordance with the procedure in FSP SOP No. 1. For aqueous samples to be analyzed for metals (including mercury), preservatives shall be added to the bottles in the field prior to sampling. All samples for which acid or base preservative has been added to the bottle prior to sample collection shall have the pH verified in the field with pH paper. Tables 4-1 and 4-2 list holding times, bottles to be used, and preservatives to be added for chemical analyses.

4.4 SAMPLE IDENTIFICATION

Each bottle used for sampling will have a label attached. An example of a preprinted sample label is shown in Figure 4-1. The sample coordinator will have the project number, matrix, and laboratory designation typed/printed onto the label, typically before sampling. This information will be recorded in a permanent record book before the sample labels are given to the individual responsible for preparing the sample bottles.

4.4.1 Sample Identification Code

The sample numbers will consist of a unique sample identification code as specified in FSP SOP No. 1. Where necessary, the label (Figure 4-1) will be protected from water and solvents with clear label protection tape.

4.4.2 Sample Coding for Database Usage

Along with the sample identification code specified in Section 4.4.1 and in FSP SOP No. 1, additional sample information will be documented in the record book

(Section 5.3) to assist in sample identification. All sample information shall be coded and recorded according to the following criteria. The recorded information shall include at a minimum the following information for identification:

- C Laboratory Data Package Number
- C Sample Number (see FSP SOP No. 1)
- C Sample Location (e.g. New Jersey State Plane Coordinates)
- C Date/Core Number/Time of Collection
- C Analytical Laboratory Designation
- C Sample Matrix
- C Type of sample (e.g., sample, field duplicate, rinsate)
- C Analyses Requested
- C Preservative
- C Name of Sampler
- C Sample Delivery Group Number

4.4.2.1 Laboratory Data Package Number

The laboratory data package number is task specific. This will allow laboratory data reports to be readily identified for the project.

4.4.2.2 Matrix

Each sampling matrix will be assigned a one digit code. Matrices and associated codes are given below for sediment and surface water. Other codes will be assigned as needed.

Sediment	1
Surface Water	2

4.4.2.3 Sample Location

The sample location will be identified by assigning a three digit number as specified in FSP SOP No. 1.

4.4.2.4 Core Number

If multiple cores are taken at a given location they will be designated by an alpha suffix to the location number as specified in SOP No 6 (Vibracoring and Piezocone Vessel Positioning).

4.4.2.5 Laboratory Designation/Required Analysis

Sample containers will be sent to one of several approved laboratories, and each laboratory will be represented by a five digit alpha identification which will be assigned following laboratory selection.

4.4.2.6 Date Sampled

Six digits will indicate the date sampled, with the first two of these being the year, the next two the month, and the last two the day of the month.

4.4.2.7 Sample Delivery Group Designation

Sample Delivery Groups (SDGs) will consist of 20 field samples including field duplicate sample submitted "blind" to the laboratory. The SDG designations will consist of a five digit alpha-numeric number assigned in the field and will appear on the corresponding Chain-of-Custody/Analysis Request Forms.

QAPP
Revision No. 1.0
January 1995
Section 4 of 14
Page 5 of 11

4.5 SAMPLING EQUIPMENT DECONTAMINATION

All sampling apparatus will be properly decontaminated prior to use in the field to prevent cross-contamination. Decontamination procedures are given in FSP SOP No. 2.

TABLE 4-1
SAMPLE BOTTLE AND PRESERVATIVE SPECIFICATIONS
AQUEOUS (FIELD RINSATE BLANK) SAMPLES¹

Parameters Analyzed	Approximate Volume ²	Container Material ³	Preservative	Holding Time ⁴
Metals	1 liter	P or G	HNO ₃ to pH<2 4EC	6 months
Mercury	1 liter	P or G	HNO ₃ to pH<2 4EC	28 days
PCDDs/ PCDFs ⁵	2 liters	G	4EC	30 days to extn, 40 days after extn
Volatile Organics	4-40 mL VOA ⁶	G w/Teflon lined septum	4EC	7 days 14 days if preserved with HCL to pH # 2
Base/Neutral Acid Organics	1 liter ^{6,7}	G	4EC	7 days to extn, 40 days after extn
Pesticides/ PCBs/ Herbicides	1 liter each ^{6,7}	G	4EC	7 day to extn, 40 days after extn
TDS	250 mL	P or G	4EC	7 days
TSS	250 mL	P or G	4EC	7 days
TEPH ⁸	1 liter	G	HCl to pH<2 4EC	28 days
Cyanide	1 liter	P	NaOH to pH>12 ⁹ 4EC	14 days

TABLE 4-1
(Concluded)

QAPP
Revision No. 1.0
January 1995
Section 4 of 14
Page 7 of 11

- 1 Analytical methods are specified in Table 7-1 of the QAPP.
- 2 Extra sample volume may be required for laboratory duplicates and laboratory spiked samples. Analyses with identical bottle and preservation requirements such as metals and mercury may be combined into the same bottle.
- 3 P = Plastic (polyethylene), G = Amber glass.
- 4 Holding time is calculated from the date and time of sample collection to the date and time of sample extraction or analysis.
- 5 PCDDs = Polychlorinated dibenzo-p-dioxins.
PCDFs = Polychlorinated dibenzofurans.
- 6 Sodium thiosulfate will be added only if oxidizers such as chlorine are present in accordance with the protocols in FSP SOP No. 1.
- 7 For each sample sent to a laboratory for analysis for extractables (i.e., base/neutral and acid extractable organics, pesticides and herbicides), an extra one-liter bottle should be provided if practical in case of breakage or spillage from one of the sample bottles.
- 8 TEPH = Total extractable petroleum hydrocarbons.
- 9 Ascorbic acid will be added if oxidizers such as chlorine are present in accordance with the protocols in SOP No. 1.

TABLE 4-2A

SAMPLE BOTTLE AND PRESERVATIVE SPECIFICATIONS FOR CHEMICAL ANALYSIS
SEDIMENT SAMPLES¹

Parameters Analyzed	Absolute Minimum Sample Weight ² (dry weight)	Desired Minimum Sample Weight ³ (wet weight)	Recommended Size Sample Container ⁴	Container Material ⁵	Preservative	Holding ⁶ Time
Metals	20g	40g	4 oz	P	4EC	6 months
Mercury	2g	4g	4 oz	G	4EC	28 days
PCDDs/PCDFs	20g	40g	4 oz	G	None	30 days to extn, 40 days after extn
Volatile Organics	10g	20g	2 x 40 ml ⁷	G, with Teflon lined lid	4EC	10 days
Base/Neutral Acid Organics	10g	20g	4 oz	G	4EC	7 days to extn, 40 days after extn
Pesticides/PCBs	60g	120g	4 oz	G	4EC	7 days to extn, 40 days after extn
Herbicides	60g	120g	4 oz	G	4EC	14 days to extn, 40 days after extn
TOC	20g	40g	4 oz	G	4EC	14 days
Radionuclides (Be ⁷ , Cs ¹³⁷ , Pb ²¹⁰)	40g	110g	4 oz	G	4EC	6 months

TABLE 4-2A
(Concluded)

Parameters Analyzed	Absolute Minimum Sample Weight ² (dry weight)	Desired Minimum Sample Weight ³ (wet weight)	Recommended Size Sample Container ⁴	Container Material ⁵	Preservative	Holding ⁶ Time
Total Extractable Petroleum Hydrocarbons	40g	80g	4 oz	G	4EC	14 days to extn, 40 days after extn
Cyanide	20g	40g	4 oz	P	4EC	14 days

¹ Analytical methods are specified in Table 7-1.

² Minimal amount estimated to be necessary for laboratory analysis assuring minimal re-extraction or reparation requirements.

³ Samples for analyses having identical container and preservation requirements may be combined in the same container.

⁴ Wide-mouth jars with Teflon-lined lids preferred; Teflon-lined lid required for volatile organics (except clear glass may be used for volatile organics).

⁵ P = plastic (polyethylene), G = amber glass (except clear glass may be used for volatile organics).

⁶ Holding time is calculated from the date of sample collection to the date of sample analysis (or extraction as noted).

⁷ Fill leaving as little headspace as possible.

TABLE 4-2B
SAMPLE CONTAINER SPECIFICATIONS FOR GEOTECHNICAL ANALYSIS
SEDIMENT SAMPLES¹

Parameters Analyzed	Desired Minimum Sample Weight/Size (wet weight)	Recommended Size Sample Container	Container Material ²
Compressibility	\$2 in. dia. x 0.5 in. ht. Intact Core	\$ 2 in. dia. Intact Core section	NA
Grain Size	300-400g	8 oz.	P, G
Dry Density ³	100g	2 oz.	P, G
Wet Bulk Density ³	300-400g	Intact Core Section	NA
Moisture Content	50g	2 oz.	P, G
Atterberg Limits	300-500g	8 oz.	P, G

¹ Geotechnical methods are specified in Table 7-2; no preservation or holding time requirements are required by the methods

² P = Plastic, G = Glass

³ Dry Density and Wet Bulk Density are determined by the same method; sample volumes may be combined if both are analyzed by the same laboratory

NA Not applicable

QAPP
Revision No. 1.0
January 1995
Section 4 of 14
Page 11 of 11

PROJECT #:	
PROJECT NAME: Passaic River Study	
SDG # _____	
SAMPLE # _____	LOCATION _____
DATE CORE COLLECTED _____	TIME CORE COLLECTED _____
BOTTLE SEQUENCE POSITION _____	
LABORATORY _____	
SAMPLE MATRIX _____	
ANALYSES REQUIRED _____	
PRESERVATIVE _____	
SAMPLER _____	
REMARKS _____	

Figure 4-1
Example of Preprinted Sample Label

5.0 SAMPLE CUSTODY

5.1 CHAIN-OF-CUSTODY

All samples collected for analysis will be continuously tracked, in the field and in transit to the laboratory, by use of the procedures specified in FSP SOP No. 1.

Upon receipt at the laboratory, the designated laboratory sample custodian shall sign the chain-of-custody form indicating receipt of the incoming field samples. The samples shall be checked against the chain-of-custody upon arrival at the laboratory. The receiving personnel will enter all arriving samples into a laboratory logbook and note any problems or discrepancies between the sample and chain-of-custody forms as well as the sample container and seal conditions and report them immediately to the field sampling coordinator. The samples shall be assigned a unique lab number for analysis or treatment which will be cross-referenced to the original field sample number, recorded in the laboratory notebook, and reported in the laboratory report. A copy of the chain-of-custody shall be returned to the Contractor QA/QC officer or the officer's designee. The original shall be retained by the sample custodian.

5.1.1 Chain-of-Custody and Sample Analysis Request Forms

The sample coordinator will first identify the required analyses and ultimate destination of each sample. Shipping and subsequent handling of samples off-site will be documented by chain-of-custody forms (Figure 5-1). Included with the chain-of-custody forms will be a sample analysis request form (Figure 5-2) specifying the analytical parameters for each sample and whether the analysis is to be performed on a rush basis. A combined chain-of-custody/analytical request form may be used instead of the two